Concealing their communication: Exploring psychosocial predictors of young drivers' intentions and engagement in concealed texting.

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Abstract

Making a conscious effort to hide the fact that you are texting while driving (i.e., concealed texting) is a deliberate and risky behaviour involving attention diverted away from the road. As the most frequent users of text messaging services and mobile phones while driving, young people appear at heightened risk of crashing from engaging in this behaviour. This study investigated the phenomenon of concealed texting while driving, and utilised an extended Theory of Planned Behaviour (TPB) including the additional predictors of moral norm, mobile phone involvement, and anticipated regret to predict young drivers' intentions and subsequent behaviour. Participants (n = 171) were aged 17 to 25 years, owned a mobile phone, and had a current driver's licence. Participants completed a questionnaire measuring their intention to conceal texting while driving, and a follow-up questionnaire a week later to report their behavioural engagement. The results of hierarchical multiple regression analyses showed overall support for the predictive utility of the TPB with the standard constructs accounting for 69% of variance in drivers' intentions, and the extended predictors contributing an additional 6% of variance in intentions over and above the standard constructs. Attitude, subjective norm, PBC, moral norm, and mobile phone involvement emerged as significant predictors of intentions; and intention was the only significant predictor of drivers' self-reported behaviour. These constructs can provide insight into key focal points for countermeasures including advertising and other public education strategies aimed at influencing young drivers to reconsider their engagement in this risky behaviour.

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1. Introduction

Ninety-eight percent of young Australians aged 15 to 24 years have a mobile phone, and 79% report using it while driving (Petroulis, 2011). A recent study by the National Roads and Motorists' Association (NRMA) Insurance found that 88% of NSW drivers make calls while driving, and 68% send text messages (Campbell, 2012). Despite the fact that 17 to 25 year olds are represented in over 20% of deaths in road crash fatalities (Department of Infrastructure and Transport [DIT], 2012) yet constitute only 12.4% of the population (Australian Bureau of Statistics [ABS], 2011), younger drivers aged 18 to 30 years are more likely to use a mobile phone while driving (McEvoy et al., 2006). General mobile phone use (including talking and texting) while driving has been associated with a two to fourfold increase in the chance of road crash (McEvoy et al., 2005; Svenson & Patten, 2005), largely due to diversion of attention away from the road and the primary task of driving.

1.1. Texting while driving

Texting while driving may be more dangerous than talking on a mobile phone while driving as it involves higher levels of cognitive distraction (e.g., reading and composing a text message), physical distraction (e.g., finding the phone), and visual distraction (e.g., eyes focusing inside the car) (Drews et al., 2009; Nemme & White, 2010; World Health Organisation [WHO], 2011). As the most prolific users of text messaging services, 15 to 24 year olds, therefore, appear to have a heightened crash risk (WHO, 2011). A simulated driving study at Monash University Accident Research Centre in Victoria found that novice drivers aged between 18 and 21 years spent 400% more time looking away from the road when they were texting than when they were not texting (Hosking et al., 2006). Despite this distraction and regardless of the illegal nature of using a handheld mobile phone while driving in Australia, drivers continue to send and receive text messages.

It has been suggested that laws banning texting are not having the desired effect as they are difficult to implement or enforce, that is, it is difficult to catch a driver texting (Farris, 2011; Gilbert et al., 2010). Texting is a sporadic activity and may not be clearly seen from outside the vehicle due to privacy mechanisms in the car (e.g., tinted windows) or the driver consciously and deliberately concealing their behaviour to avoid being fined (Farris, 2011; Gilbert et al., 2010). The US Highway Loss Data Institute (2010) investigated 3,313,507 collision claims from 30 US states to determine whether recently introduced laws banning motorists from texting have resulted in reduced collision claims. Results of regression analyses showed that, rather than a reducing collision claims there had actually been a small

increase relative to neighbouring states without such laws. The authors hypothesised that drivers may be responding to the law by continuing to text while driving, but in a more dangerous, concealed manner, thereby increasing crash risk (Highway Loss Data Institute, 2010).

As concealed texting while driving may be less easily policed than other major road safety issues, such as speeding and drink-driving, there is a need to investigate alternate measures that could potentially reduce the prevalence of this behaviour to support enforcement efforts. One such method is to investigate the underlying motivations of concealed texting while driving that may provide focal points for the development of alternate preventative measures such as advertising and public education strategies. Such an approach, in identifying key motivations underpinning behaviours has been useful in developing message content for other risky driver behaviours, such as speeding (e.g., Horvath, Lewis, & Watson, 2012; Lewis, Watson, White, & Elliott, 2013). It is important to note, however, that advertising is not the only strategy that could be used to address concealed texting while driving; rather, consistent with the broader view of advertising as a road safety countermeasure, it is one long-standing and on-going countermeasure within an array of strategies and policies implemented to reduce risky driver behaviour.

The term 'concealed' implies a deliberate, pre-meditated behaviour, carried out by a driver who is cognisant of wrongdoing and yet chooses to engage in the activity anyway. Despite a growing body of literature on general mobile phone use while driving, only minimal research to date has examined texting while driving, and few, if any researchers have carried out theoretically-driven investigations with explicit reference to concealed texting while driving. While previous studies have tended to focus on general mobile phone use and thus, tended to regard talking and texting as a homogenous general phone use behaviour, a few studies (e.g., Nemme & White, 2010; Walsh et al., 2007) have found support for talking and texting as distinct behaviours (i.e., with different factors found to predict people's intentions to engage in such behaviours). Although these previous studies did not refer specifically to investigating concealed texting, it is likely this behaviour was included, along with other methods of texting, such as obvious texting.

A study of concealed texting as a discrete and particularly problematic form of texting behaviour requiring further diversion from the task of driving, would build on this emerging idea that general mobile phone use while driving may be more complex than first considered, comprising a number of distinct sub-behaviours. An understanding of the psychological

predictors of the specific behaviour of concealed texting while driving may be of benefit to potentially reduce and ultimately prevent this high risk behaviour among young drivers.

1.2. The theory of planned behaviour

The Theory of Planned Behaviour ([TPB], Ajzen, 1985) is a well-validated decision-making model that has been utilised successfully to predict people's intention across a range of behaviours (Armitage & Conner, 2001) including general mobile phone use while driving (e.g., Walsh et al., 2007; Walsh et al., 2008; White et al., 2010) and general texting (i.e., not defined explicitly as concealed or otherwise) while driving (e.g., Nemme & White, 2010). It follows then, that the TPB should also be an effective model for predicting concealed texting while driving.

The TPB (Ajzen, 1985) is a widely used model for the explanation of human social behaviour with attitude, subjective norm, and PBC said to predict intention. Attitude is defined as how positively the behaviour is evaluated, subjective norm is the perceived social pressure to perform or not perform the behaviour and comply with social standards, and perceived behavioural control (PBC) is the perceived ease or difficulty of performing the behaviour and can reflect past experience as well as consideration of obstacles (Ajzen, 1991). The relative importance of each of these constructs varies across behaviours and situations (Ajzen, 1991). Overall, studies have shown attitude and PBC to be reliable predictors of intention whereas, subjective norm has shown mixed results (Ajzen, 1991). Although intention is the immediate determinant of behaviour in the TPB model, in reality there are many factors, both internal (e.g., will power) and external (e.g., money), that can block this pathway. Actual engagement in the behaviour can depend on the amount of control one has over these factors (Ajzen, 1985), and therefore, PBC and intention together are said to predict behaviour. In a meta-analysis of 185 studies, Armitage and Conner (2001) found the standard TPB constructs accounted for 27% of the variance in behaviour and 39% of the variance in intention to perform the behaviour. Nemme and White (2010) found that the TPB accounted for a significant proportion of the variability in young drivers' intentions to send and read texts (i.e., 28% and 29% respectively) and variance in the actual behaviour of sending and receiving texts while driving (i.e., 10% and 14.2% respectively).

As stated by the TPB, therefore, in the current study it was hypothesised that the standard TPB constructs of attitude, subjective norm, and PBC would predict drivers' intentions to text in a concealed manner in the next week. In particular, the more positive their attitude towards this behaviour, the more they believed it would be approved of by important referents, and the

more control they perceived having over the behaviour the more likely they would be to engage in the behaviour. Also consistent with the TPB, it was expected that intention and PBC would together predict subsequent concealed texting behaviour.

1.3. Additional variables

Despite these previous studies supporting the ability of the standard TPB constructs to predict people's intentions and behaviour, as highlighted by the meta-analysis findings cited previously a significant amount of variance remains unexplained. It has been suggested that extending the TPB to include other predictors may help account for additional variance in behavioural decisions over and above the standard TPB constructs (Ajzen, 1991, 2011; Armitage & Conner, 2001; Conner & Armitage, 1998). According to Ajzen (1991), inclusion of additional predictor variables is warranted if they make theoretical sense and add significant variance to people's intentions and/or behaviour.

Studies investigating predictors of people's intention to use a mobile phone in general while driving have typically utilised an extended TPB. In addition to the standard TPB constructs of attitude, subjective norm, and PBC, other predictors, such as moral norm (Nemme & White, 2010) and mobile phone involvement (White et al., 2012) have been added. This study builds on the results of these studies, examining the additional predictors of moral norm and mobile phone involvement, as well as considering the role that anticipated regret plays, in testing the utility of an extended TPB for predicting young people's intention to engage in, and subsequent engagement in, concealed texting while driving. While largely exploratory in nature due to the lack of previous studies examining concealed texting explicitly, it was hypothesised that moral norm, mobile phone involvement, and anticipated regret would together significantly account for additional variance in intentions over and above the standard TPB constructs.

1.3.1. Moral norm

Moral norm refers to a person's sense of moral obligation in terms of deciding what is right and wrong based on society's values to perform a behaviour or not (Ajzen, 1991). The addition of moral norm may be worthwhile in certain contexts, such as when investigating unethical or illegal behaviours (Ajzen, 1991). As concealed texting while driving is an illegal behaviour, it follows, then, that people's intention to engage in, and actual engagement in this behaviour, may involve moral considerations (Ajzen, 1991; Conner & Armitage, 1998). Further to this, studies have produced mixed results for the predictive ability of subjective

norm, so it has been suggested that more personal normative influences on intentions may be addressed by the inclusion of moral norm (Ajzen, 1991; Conner & Armitage, 1998).

In support of this proposal, Nemme and White (2010) investigated psychosocial influences of sending and receiving texts in general while driving among young people and found that moral norm significantly predicted both people's intention and actual behaviour to engage in texting in general while driving. Similarly, in their study investigating intentions to exceed the speed limit, Conner et al. (2007) found moral norm to be a significant predictor. Consistent with previous research findings regarding moral norm, it was hypothesised that young people who regard concealed texting while driving as an immoral behaviour will be less likely to intend to engage in this behaviour.

1.3.2. Mobile phone involvement

As excessive use of technology in general has been compared with addiction (Bianchi & Phillips, 2005; Ehrenberg et al., 2008; Walsh et al., 2010; White et al., 2012; Wilson et al., 2010). Walsh et al. (2010) developed the Mobile Phone Involvement Questionnaire (MPIQ) to investigate the relationship between addictive tendencies and mobile phone use. The MPIQ comprises eight items and assesses participants' cognitive and behavioural association with their mobile phone. Based on Brown's (1997) components of addiction, it specifically measures withdrawal, cognitive and behavioural salience, euphoria, loss of control, relapse, and reinstatement, conflict with other activities, and interpersonal conflict associated with mobile phone use (Walsh et al., 2010). Mobile phone 'use' was differentiated from 'involvement' which includes additional ways that people interact with their phone when they are not using it to communicate with others (e.g., checking for missed calls, thinking about their phone). The results showed that the MPIQ is a reliable measure of the predictors of mobile phone use and mobile phone involvement in 15 to 24 year olds (Walsh et al., 2010).

It follows that the more involved people are with their mobile phones, the more likely they are to engage in behaviours with potential negative outcomes, such as mobile phone use while driving (Walsh et al., 2010, 2011), as the perceived need for constant connection supersedes the perception of danger (White et al., 2012). In support of this notion, White et al. (2012) found that mobile phone involvement significantly predicted young people's intentions to use a mobile phone (i.e., making and receiving calls, sending and reading text messages) while driving. Based on previous studies, it was expected that participants who had a higher involvement with their mobile phone, would be more likely to text in a concealed manner while driving.

1.3.3. Anticipated regret

The traditional TPB constructs do not recognise the contribution that affect and emotions may play in influencing intentions and behaviour (Ajzen, 1991, 2011). However, as affect appears to be able to influence salient beliefs, it is possible that affect can influence intentions and behaviour more directly and, indeed, inclusions of affective constructs in an extended model have been encouraged (Ajzen, 1991, 2011). Anticipated regret is an affective construct that has been shown to significantly influence people's intentions over and above the standard TPB constructs (Ajzen, 2011; Conner & Armitage, 1998; Sandberg & Conner, 2008). This influence is more likely when consequences of performing the behaviour are likely to have a negative affective impact and the individual anticipates the regretful feeling that will occur after they perform the behaviour (Conner & Armitage, 1998). Conner et al. (2007) found anticipated regret to be a significant negative predictor of drivers' intention to exceed the speed limit and contributed an additional 2% of unique variance. As concealed texting while driving is also an illegal and risky behaviour, it follows that it may be accompanied by increased feelings of anticipated regret. In the current study, it was expected that young people who scored high on anticipated regret for concealed texting while driving would be less likely to intend to engage in this behaviour.

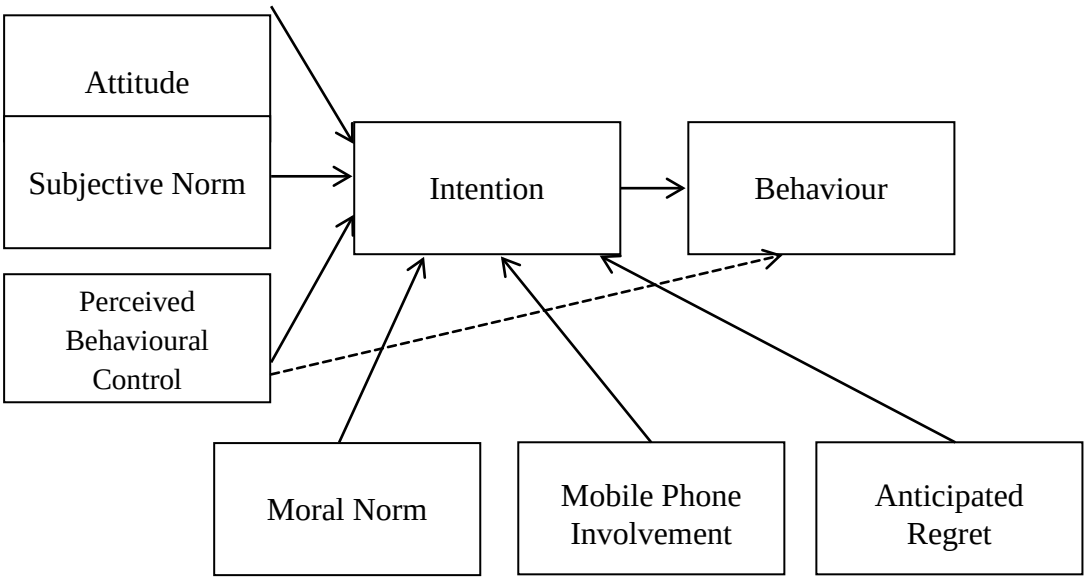

Figure 1. The Extended Theory of Planned Behaviour Model with the Additional Predictors of Moral Norm, Mobile Phone Involvement, and Anticipated Regret

1.4. The current study

Notwithstanding the growing body of research examining predictive factors of general mobile phone use (including texting in general) while driving among young adults, few, if any, studies have looked at the specific phenomenon of concealed texting while driving. The aim of this study, therefore, was to address the gap in the current evidence and explore predictive factors associated with the intention to engage in concealed texting among young drivers, aged 17 to 25 years. The study also investigated the degree to which intention and PBC were predictive of subsequent concealed texting behaviour. An extended model of the TPB was used, with the additional predictors of moral norm, mobile phone involvement, and anticipated regret (see Figure 1).

2. Method

2.1. Participants

Participants (n = 171, 126 females, 37 males, 8 unreported) were mainly first year psychology students (n = 110) recruited at lectures or self-selected via an online recruitment system at a large Australian university. Extra participants (n = 61) were recruited from other faculties on the campus grounds and from snowballing. All participants were aged between 17 and 25 years (M = 20.0, *Mode* = 18, SD = 2.4), 79.5% owned a touchscreen phone, 10.5% owned a phone with a keypad, 84.2% had an open or provisional licence, 10.5% had a learner's permit (i.e., a restricted licence given those who are learning to drive), and 60.2% had completed high school as their highest level of education. On average, the participants reported driving 6.9 hours per week (SD = 4.9) in either an automatic (52.6%) or a manual car (42.1%). The response rate for completion of the follow-up questionnaire was 77% (n = 131). Most participants had the option of either completing the online (n = 83 for main; n = 117 for follow-up) or hard copy (n = 88 for main; n = 14 for follow-up) version of the questionnaires. For their participation in both questionnaires, first year psychology students received course credit while all other participants were eligible to enter the draw to win one of three $AUD50 store vouchers.

2.2. Materials/measures

This study comprised a main questionnaire and a follow-up questionnaire administered a week apart. The target behaviour of concealed texting while driving was defined as "making a conscious effort to hide the fact that you are texting while driving (e.g., by hiding your phone below the window or steering wheel). In doing so, it is not obvious to people outside

your vehicle that you are texting"[1]. The main questionnaire also assessed if drivers' perceptions of performing concealed texting were unique by comparing participant responses for concealed texting to identical items for obvious texting (i.e., "not making a conscious effort to hide the fact that you are texting while driving. In doing so, it may be obvious to people outside your vehicle that you are texting"). The follow-up questionnaire assessed reported engagement in both behaviours in the 1-week interim period.

2.2.1. Main questionnaire

The main questionnaire was based on the standard TPB self-report format regarding attitude, subjective norm, PBC, and intention (Fishbein & Ajzen, 2009). It also included the additional predictors of moral norm, mobile phone involvement, and anticipated regret.

Obvious texting was also measured on attitude, subjective norm, PBC, and intention as outlined in the descriptions below. Some of the items were negatively worded and, therefore, reverse scored prior to analysis. Unless otherwise stated, items were scored on a seven-point likert scale of (1) *strongly disagree* to (7) *strongly agree.* Minor amendments to wording were made to the questionnaire based on feedback from a second pilot study (n = 5 young drivers). As outlined in Fishbein and Ajzen (2009), the questions were framed in terms of reference to the target behaviour, action, context, and time. Thus, the target behaviour was "texting in a concealed manner while driving in the next week". The questionnaire also assessed demographic data (e.g., gender, age, education level) as well as the baseline frequency of concealed general mobile phone use while driving (e.g., sending a text message, reading a text message, making a call, receiving a call).

2.2.1.1. Intention

Three items measured intention (e.g., "I intend to text in a concealed manner while driving in the next week") and formed a reliable scale for concealed texting (Cronbach's α = .90) and for obvious texting (Cronbach's α = .86).

2.2.1.2. Attitude

Attitude towards concealed texting while driving was assessed using four, seven-point semantic-differential scales (e.g., "For me, texting in concealed manner while driving in the next week would be" (1) *Harmful* to (7) *Harmless*) and formed a reliable scale for concealed texting (Cronbach's α = .90) and for obvious texting (Cronbach's α = .91).

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[1] A small pilot study (n = 12 young drivers) was conducted to determine an appropriate definition of 'concealed texting'.

2.2.1.3. Subjective norm

Three items measured subjective norm (e.g., "People important to me would want me to text in a concealed manner while driving in the next week") and formed a reliable scale for concealed texting (Cronbach's $\alpha = .87$) and for obvious texting (Cronbach's $\alpha = .86$).

2.2.1.4. PBC

Two items measured PBC (e.g., "I am confident that I could text in a concealed manner while driving and still drive safely") which were strongly and positively correlated for concealed texting, $r(167) = .75$, $p < .001$, and for obvious texting, $r(161) = .68$, $p < .001$.

2.2.1.5. Moral norm

Two items, based on the scale developed by Godin et al. (2005), measured moral norm (e.g., "It would be against my principles to text in a concealed manner while driving") and were strongly and positively correlated, $r(166) = .48$, $p < .001$.

2.2.1.6. Mobile phone involvement

Mobile phone involvement was measured with the MPIQ which comprised eight items, developed by Walsh et al. (2010). It assessed participants' cognitive and behavioural association with their mobile phone (e.g., "I often think about my mobile phone when I am not using it"). Previous studies (e.g., Walsh et al., 2010, 2011) reported a moderate reliability for the MPIQ ($\alpha = .78$ to $.80$), and it was reliable in this study ($\alpha = .87$).

2.2.1.7. Anticipated regret

Anticipated regret was measured with two items adapted from previous studies (Abraham & Sheeran, 2003; Conner & Armitage,1998) and measured the anticipated regret of texting in a concealed manner while driving, (e.g., "If I text in a concealed manner in the next week I would feel regret") and were strongly and positively correlated, $r(166) = .78$, $p < .001$.

2.2.2. Follow-up questionnaire

The follow-up questionnaire, administered 1 week after the main questionnaire, asked participants to report how many times in the past week they had texted in both a concealed and obvious manner while driving. Consistent with previous related research (Nemme & White, 2010), the 1 week time frame was chosen as an adequate period for the behaviour to be enacted and for participants to remember their actions accurately.

2.3. Procedure.

Prior to commencement of the study, ethics approval was obtained from the University's Human Research Ethics Committee. Participants were provided with an information sheet that described the project, including what participation involved, expected benefits and risks,

and confidentiality. Participants who completed the hard copy version of the main questionnaire had the option of either the hard copy or online version of the follow up questionnaire. For the online version, the participant was asked for an email address to forward the link to the follow-up questionnaire. If they completed the hard copy version, a meeting time a week later was organised with the first named author. Each participant generated a unique code identifier based on various prompts (e.g., second letter of mother's first name) so that their two questionnaires could be linked anonymously. Return of a completed questionnaire was considered provision of consent to participate.

3. Results

3.1. Data pre-checks

To determine whether concealed texting and obvious texting while driving represented two distinct behaviours, a repeated measures MANOVA was conducted comparing these two behaviours on the standard TPB constructs (i.e., attitude, subjective norm, PBC, and

Table 1

Means, Standard Deviations, 95% Confidence Intervals, and Mean Differences Comparing Concealed and Obvious Texting While Driving[2]

	M	*SD*	95% CI	Mean Difference
Intention				
Concealed	3.40	1.75	[3.12, 3.68]	1.10***
Obvious	2.30	1.36	[2.01, 2.52]	
Attitude				
Concealed	2.87	1.37	[2.65, 3.09]	0.89***
Obvious	1.98	1.23	[1.80, 2.16]	
Subjective Norm				
Concealed	2.02	1.11	[1.84, 2.20]	0.38***
Obvious	1.64	0.85	[1.50, 1.78]	
PBC				
Concealed	4.45	1.67	[4.18, 4.72]	0.82***
Obvious	3.63	1.73	[3.35, 3.91]	

Note. *M* = mean; *SD* = standard deviation; CI = confidence interval.

*** $p < .001$.

[2] See Gauld, Lewis, and White (in press) for a detailed analysis of concealed and obvious texting. This additional paper outlines the results of a repeated measures MANOVA showing significant differences between all of the standard and extended TPB constructs, as well as differences in the significant predictors of CT and OT in the final regression model.

intention) (see Table 1). Findings showed significant differences between concealed and obvious texting for all of the constructs examined with mean scores all higher for concealed texting than obvious texting while driving (Wilks's $\Lambda = .62$, $F(4, 155) = 23.45$, $p < .001$). Thus the findings of these analyses indicated that the behaviours of obvious and concealed texting may be distinct and, as such, subsequent analyses focused only upon the specific target behaviour of interest, concealed texting.

Pre-checks were conducted to determine whether any significant differences existed between participants who completed the hard and online versions of the main questionnaire in relation to a range of demographic characteristics as well as on some of the study's key measures. The results of chi-square analyses for gender, $\chi^2(1) = 0.01$, $p = .925$, and car type, $\chi^2(1) = 0.50$, $p = .481$ were not significant. Similarly, results of a one-way MANOVA for all remaining main questionnaire variables were not significant (Wilks's $\Lambda = .97$, $F(7, 148) = 0.77$, $p = .611$), thus confirming that there were no significant differences for the responses between participants who completed the hard copy or online version of the questionnaire. Further, a one-way MANOVA conducted on all the main questionnaire variables (e.g., intention, attitude, subjective norm, PBC) confirmed that there were no significant differences between the responses depending on whether participants completed the follow-up questionnaire or not (Wilks's $\Lambda = .93$, $F(7, 148) = 1.48$, $p = .178$).

Table 2

Reported Frequencies (%) of General Mobile Phone Use (Including Talking and Texting)

How often do you do the following in a concealed manner while driving:	More than once per day	Daily	1 – 2 times per week	1 – 2 times per month	1 – 2 times per 6 months	Once a year	Never
Use a mobile phone for any purpose?	9.9%	22.2%	29.2%	10.5%	8.2%	3.5%	16.4%
Send a text message?	9.4%	14.6%	26.9%	11.1%	7.6%	1.8%	28.7%
Read a text message?	11.1%	21.6%	28.1%	9.9%	4.7%	5.3%	19.3%
Make a phone call?	7.6%	12.9%	18.7%	17.0%	10.5%	0.6%	32.7%
Answer a phone call?	8.8%	14.0%	22.2%	14.0%	9.4%	4.7%	26.9%

3.2. Descriptive analysis

Table 2 describes how often participants reported engaging in concealed mobile phone use while driving. For example, 50.9% of participants reported sending a text message in a concealed manner at least 1 to 2 times per week and 60.8% reported reading a text message in a concealed manner while driving at least 1 to 2 times per week. In comparison, 39.2% of participants reported making a phone call in a concealed manner (i.e., by using loudspeaker function) while driving at least 1 to 2 times per week, and 45% reported answering a phone call in a concealed manner (i.e., by using loudspeaker function) while driving at least 1 to 2 times per week, showing concealed texting while driving to be a more common behaviour.

than talking on the phone in a concealed manner while driving in this sample of young drivers.

Means, standard deviations, and bivariate correlations for the independent variables and dependent variables are presented in Table 3. All of the standard TPB predictor variables, were significantly and positively correlated with intention. Of the extended predictor variables, mobile phone involvement was significantly and positively correlated with intention and moral norm and anticipated regret both had significant negative correlations with intention. Intention was most strongly correlated with behaviour.

3.3. Hierarchical multiple regression predicting intentions to conceal texting while driving.

An hierarchical multiple regression was conducted to determine the extent to which the standard TPB constructs predicted young people's intention to conceal texting while driving and the extent to which the extended variables predicted intention, over and above the standard TPB constructs. Table 4 displays the results of the regression, with the TPB variables of attitude, subjective norm, and PBC entered into step 1, and the extended variables of moral norm, mobile phone involvement, and anticipated regret, entered into step 2.

Results showed that the standard TPB variables entered at step 1 accounted for a significant 68.7% (68.1% adjusted) of the variance in intention to conceal texting while driving, $R^2 = .687$, $F(3,152) = 111.24$, $p < .001$. The addition of the extended TPB variables at step 2 added a significant 6.0% (5.6% adjusted) to the prediction of intention, $\Delta R^2 = .060$, $\Delta F(3, 149) = 11.731$, $p < .001$. Overall, model 2, containing both the standard and extended

Table 3

Means, Standard Deviations and Bivariate Correlations for Standard and Extended TPB Constructs

	M	*SD*	1	2	3	4	5	6	7	8
1. Intention	3.45	1.77	-	.76***	.42***	.75***	-.46***	-.65***	.41**	.72***
2. Attitude	2.93	1.42		-	.42***	.64**	-.53***	-.63***	.27***	.60***
3. Subjective Norm	2.03	1.13			-	.33***	-.31***	-.22**	.24**	.32***
4. PBC	4.46	1.69				-	-.44***	-.55***	.18*	.59***
5. Anticipated regret	4.12	1.63					-	.71**	-.05	-.37***
6. Moral Norm	4.44	1.51						-	-.22**	-.52***
7. Mobile Phone Involvement	4.04	1.18							-	.31***
8. Behaviour	2.56	1.74								-

Note. M = mean; *SD* = standard deviation.

* $p < .05$. ** $p < .01$. ***$p < .001$.

Table 4

Hierarchical Multiple Regression Analysis with Standard and Extended TPB Constructs

	Variable	*B* [95% CI]	β	R^2	ΔR^2	sr^2
Step 1	Attitude	0.53 [0.37, 0.69]	.42***	.69***	.69***	.09
	Subjective Norm	0.16 [0.00, 0.31]	.10*			.01
	PBC	0.46 [0.33, 0.59]	.44***			.10
Step 2	Attitude	0.38 [0.22, 0.54]	.30***	.75***	.06***	.04
	Subjective Norm	0.16 [0.01, 0.30]	.10*			.01
	PBC	0.37 [0.25, 0.50]	.36***			.06
	Moral Norm	-0.31 [-0.48, -0.14]	-.27***			.02
	Mobile Phone Involvement	0.26 [0.13, 0.39]	.18***			.03
	Anticipated Regret	0.10 [-0.04, 0.23]	.10			.00

Note. *B* = unstandardised regression coefficient; β = standardised regression coefficient; sr^2 = squared semi-partial correlations

* $p < .05$. ** $p < .01$. *** $p < .001$.

TPB constructs, was significant, $F(6, 149) = 73.26$, $p < .001$, with the significant predictors of intention being PBC, attitude, subjective norm, moral norm, and mobile phone involvement.

3.4. Logistic regression to predict the probability of enacting the behaviour.

To test which variables were able to predict whether the behaviour of concealed texting while driving was enacted or not within the space of 1 week, a logistic regression was conducted using the behavioural outcome measure assessed via the follow-up questionnaire (see Table 5)[3]. Behaviour was coded as '0' (not enacted), and '1' (enacted), where '1' was the target outcome category. Intention and PBC were entered into step 1, and subjective norm, attitude, moral norm, mobile phone involvement, and anticipated regret were entered into step 2. Step 1 produced a significant chi-square test of improvement in classification rate compared to chance, $\chi^2(2) = 82.18$, $p < .001$, with the percentage of correct classifications at 83.5%. Intention was the only significant predictor of behaviour, Nagelkerke $R^2 = .64$, Wald $\chi^2(1) = 23.07$, $p < .001$. The odds ratio for intention in this model indicated that, for a 1 unit change in intention, the estimated change in the odds of enacting the behaviour of concealed texting while driving was 3.78 (Exp(B) = 3.78, 95% CI [2.20, 6.50]).

Although the addition of the other predictor variables in step 2 also significantly reduced the error in classification, $\chi^2(7) = 84.86$, $p < .001$, with the percentage of correct classifications at 87%, intention remained as the only significant predictor of behaviour, Nagelkerke $R^2 = .66$, Wald $\chi^2(1) = 10.99$, $p = .001$. The odds ratio for intention in step 2 indicated that, for a one unit change in intention, the estimated change in the odds of enacting concealed texting while driving is 2.96 (Exp(B) =2.96, 95% CI [1.56, 5.64]).

[3] This analysis was also run with behaviour as a continuous variable and the same pattern of results emerged (i.e., intention was the only significant predictor of behaviour)

Table 5

Logistic Regression Predicting the Probability of Enacting the Behaviour of Concealed Texting While Driving

	Variable	B	SE	Wald	Sig	Exp(B) [95% CI]
Step 1	Intention	1.33	.28	23.07	.000***	3.78 [2.20, 6.50]
	PBC	0.25	.21	1.37	.243	1.28[0.85, 1.93]
Step 2	Intention	1.09	.34	10.99	.001**	2.96 [1.56, 5.64]
	PBC	0.22	.23	0.94	.332	1.26[0.80, 1.96]
	Attitude	0.26	.29	.78	.377	1.30 [0.73, 2.30]
	Subjective Norm	0.30	.36	0.69	.407	1.34 [0.67, 2.70]
	Moral Norm	-0.21	.34	0.36	.551	0.82 [0.42, 1.60]
	Mobile Phone Involvement	0.04	.25	0.03	.870	1.04 [0.64, 1.70]
	Anticipated Regret	0.21	.26	0.66	.416	1.24 [0.74, 2.06]

Note. $^{**}p<.01$. $^{***}p<.001$.

4. Discussion

The aim of this study was to explore predictive factors, based on an extended TPB, associated with the intention to and behaviour for texting in a concealed manner among young drivers, aged 17 to 25 years. Overall, there was support for the ability of the standard TPB constructs to predict concealed texting while driving. There was also support for the ability of the additional predictors to significantly account for additional variance in intentions over and above the standard TPB constructs. Individually, moral norm and mobile phone involvement were significant predictors, however anticipated regret was not. For behaviour, intention was the only significant predictor, showing some support for the TPB which posits that intention and PBC, in combination, predict behaviour.

4.1. Efficacy of the TPB standard constructs

The expectation that the standard TPB constructs of attitude, subjective norm, and PBC would predict a young driver's intentions to text in a concealed manner in the next week was

supported. These variables accounted for 69% of the variance in intention when entered into step 1 of the model. Further, as expected, each construct was a significant predictor of intention with a more positive attitude towards concealed texting while driving, the more participants believed the behaviour would be approved of by important referents (subjective norm), and the greater the perception of control over this behaviour (PBC) were associated with a higher intention to engage in the behaviour.

As this study was a preliminary empirical investigation of the specific behaviour of concealed texting while driving, comparisons with previous research are somewhat tenuous given they investigated texting in general (i.e., not defined as concealed or otherwise) while driving as opposed to explicitly defining texting as concealed or otherwise. Although these previous studies did not refer specifically to investigating concealed texting, it is likely this behaviour was included, along with other methods of texting, such as obvious texting. With this caveat in mind, previous research utilising the TPB to investigate texting in general while driving found that the TPB constructs accounted for between 11% and 28.9% of the variance in intention (Nemme & White, 2010; Walsh et al., 2007, 2008). In this study, the standard TPB variables accounted for 69% of variance in intention. It appears that, as anticipated, the TPB may be a particularly effective model to explain this illegal behaviour, which is a behaviour requiring rational decision making as drivers consciously try to conceal their actions. With regard to the individual standard constructs, previous studies have shown mixed support for the predictive utility of subjective norm; and in the current study, although significant, subjective norm was a relatively weak predictor ($\beta = .10$, $p = .04$) when compared to attitude ($\beta = .30$, $p < .001$) and PBC ($\beta = .36$, $p < .001$).

These findings suggest that intervention strategies could target all three standard TPB constructs. Advertising efforts could challenge the positive attitude (and benefits) associated with concealed texting while driving by, for example, emphasising the costs, especially dangers, such as heightened crash risk. Interventions could focus on challenging the ease with which drivers believe they are able to conceal their texting while driving (PBC) by, for example, showing drivers swerving and crossing the median strip while engaging in this behaviour. As subjective norm was also a significant predictor of intention, interventions could focus on the disapproving influence of important referents, such as parents and partners.

4.2. Influence of the additional variables

The expectation that the additional variables (i.e., moral norm, mobile phone involvement, and anticipated regret) in the extended TPB model would have a significant

impact on young driver's intention to engage in concealed texting, over and above the standard TPB constructs, was supported overall even though not all of the individual constructs emerged as significant predictors. Specifically, the additional constructs together explained an extra 6% of variance over and above the standard constructs. Moral norm and mobile phone involvement emerged as significant predictors of intentions, however anticipated regret did not. In total, the full model including the standard and extended variables accounted for 75% of the variance in young people's intention to conceal texting while driving.

4.2.1. Moral norm

This study found that young drivers who regarded concealed texting while driving as an immoral behaviour were less likely to intend to engage in it. Although they did not examine concealed texting explicitly, these results align with Nemme and White's (2010) finding that moral norm, was a significant predictor of both sending and reading text messages while driving. This result also supports previous research that found moral norm to be a significant predictor of intention to exceed the speed limit (Conner et al., 2007); and it supports the idea than moral norm may be a useful predictor, especially when the behaviour is unethical (Ajzen, 1991; Beck & Ajzen, 1991), or illegal, such as concealed texting. The current findings also identify moral norm as a stronger factor in explaining normative influences within the extended TPB framework than subjective norm.

Given this significant result, intervention strategies could focus on moral norm by emphasising the illegal nature of this behaviour, and the importance of adhering to the road rules. Focusing on the responsibility of the driver to ensure the safety of their passengers may encourage young drivers to consider turning their mobile phone off or onto silent before they start driving.

4.2.2. Mobile phone involvement

This study found that participants who scored higher on mobile phone involvement, suggesting they have higher levels of behavioural and cognitive association with their phones, were more likely to text in a concealed manner while driving. This result is similar to White et al. (2012) who found that mobile phone involvement was a significant predictor of mobile phone use (in general) while driving over and above the standard TPB constructs.

This result suggests that the more involved a young driver is with their mobile phone, the more likely they are to believe that staying connected with others is more important than the potential negative consequences of engaging in risky behaviours (White et al., 2012). Advertising efforts, therefore, could challenge individuals' perceived need to constantly be

connected to others by highlighting the importance of getting to their destination safely over texting an immediate reply. A focus on the relative unimportance of having a friend wait for a reply compared to the potentially fatal consequences associated with the visual, cognitive, and physical diversion from the primary task of driving associated with concealed texting, may encourage young drivers to reconsider engaging in this behaviour.

4.2.3. Anticipated regret

The expected result that those with higher anticipated feelings of regret for concealed texting while driving would be less likely to intend to engage in this behaviour did not emerge in the present study. This result, therefore, did not support the results of a previous study that found anticipated regret to be a significant negative predictor of drivers' intention to exceed the speed limit (Conner et al., 2007).

Recently it has been suggested that anticipated regret should be measured both with regard to performing the behaviour and to not performing the behaviour, with the latter representing a different construct (Fishbein & Ajzen, 2009, Sandberg & Conner, 2008) with a distinct goal system (Richetin, Conner, & Perugini, 2011). Richetin et al (2011) investigated this issue for three behaviours within the TPB framework, specifically eating meat, breastfeeding and vigorous physical activity. Their results showed support for the suggestion that the two forms of anticipated regret represent distinct constructs that contribute independently to the prediction of intention and behaviour. Sandberg and Conner (2008) suggested future research could divide anticipated regret into both anticipated 'action regret' and anticipated 'inaction regret' rather than only investigate the composite construct comprised of these two forms of regret.

The idea of 'anticipated inaction regret' may be particularly relevant in studies of concealed texting while driving in young people. The significant amount of variance in intention accounted for by mobile phone involvement in the present study, suggests that young drivers' perceived need for connectedness may override their perceived risk of engaging in this illegal and risky behaviour. In support of this idea, previous studies have shown that, despite the illegal nature of mobile phone use in general while driving, the persistence of this behaviour may be due to the perceived benefits outweighing the perceived risks, such as crashes or police apprehension (Atchley et al., 2011; Foss et al., 2009; Jessop, 2008; Nelson et al., 2009; Svenson & Patten, 2005). Concealed texting, by its very nature may be difficult for police to detect and enforce, and so the fear of apprehension may be especially low. Therefore, consequences of inaction, such as not returning a friend's text message while driving, may indeed have a greater negative affective impact than the negative

affective impact associated with the action of engaging in this risky and illegal behaviour. Future research should therefore investigate the impact of anticipated inaction regret of concealed texting while driving in young people.

4.3. Behaviour

With regard to actual engagement in concealed texting while driving, intention emerged as the only significant predictor in the present study. Although meta-analytic studies have shown intention and PBC account for a significant percentage of variance in behaviour (e.g., Sandberg & Conner, 2008), this result is similar to that of Nemme and White (2010) where intention was the only significant predictor for the final model for sending and receiving texts while driving. It is likely, therefore, that the influence of PBC on behaviour occurred indirectly through intention.

4.4. Strengths and limitations

This study was the first theoretically-driven investigation of concealed texting while driving. The measurement of actual behaviour helped to determine how well people's intentions are linked with their behaviour. The study's focus on young drivers who have a high crash risk (DIT, 2012) and are the highest users of text messaging services (WHO, 2011) reinforce the study's high degree of practical applicability. Efforts were made to recruit participants beyond first year university students.

The study also had limitations. The use of self-report measures for an illegal behaviour may have caused some participants to respond according to social desirability (Beck and Ajzen, 1991). It is also possible that completing the main questionnaire impacted on the responses in the follow-up questionnaire by raising awareness of concealed texting and thereby reducing or at least altering the frequency of the behaviour in the interim week. In addition, the follow-up questionnaire made the assumption that participants did in fact drive in the interim week; future research should check this explicitly. There may have been variability in participants' interpretation of the phrase 'texting while driving' (e.g., does it include texting while stopped at traffic lights?) implying that a composite, rather than individual, behaviour was being investigated. This could be addressed in future studies by providing a more detailed definition of concealed texting that includes particular situations (e.g., only while the car wheels are in motion). Finally, future studies should include more males as the sample in this study was 78% female, potentially limiting the study's generalisability.

4.5. Future research

As this is the first study to examine concealed texting while driving, future research should continue to investigate this phenomenon as it represents a potential road safety issue. As concealed texting involves a conscious wrongdoing, it may be interesting to investigate its association with concepts such as deviance and conformism. In addition, future research could investigate concealed talking on a mobile phone while driving, as a comparison to concealed texting while driving, and to determine if it is a distinct behaviour to more obvious talking on a mobile phone while driving. It would also be worthwhile to examine the predictors of obvious mobile phone behaviours while driving (i.e., talking and/or texting) to investigate if people are actually aware of their wrongdoing, and, if they are, whether their need to stay connected to others overrides this awareness. An exploration of the idea of 'anticipated inaction regret' may increase our understanding of the anticipated regret construct, and help determine whether avoidance of the illegal behaviour of concealed texting while driving or the need to stay connected, provides a stronger motivation. Overall, it would be interesting to ascertain if these results are generalizable to other age groups or whether the results of this study are particular to young people aged 17 to 25 years.

5. Conclusion

This study provides an initial investigation of concealed texting while driving in young people and builds on important previous research of psychosocial predictors of general mobile phone use (including texting) while driving. The results of this study provide support for the predictive utility of the standard TPB constructs for this deliberate behaviour. It also provides support for the inclusion of the additional predictors of moral norm and mobile phone involvement.

Concealed texting while driving is a pervasive road safety issue, particularly among young drivers. Studies such as the current one are paramount if our understanding of this potentially life-threatening activity is to be advanced, driver behaviour is to be changed, and ultimately lives are to be saved. Although future research in this area of concealed use is warranted, these results have the potential to help inform public education and advertising strategies and potentially make young people reconsider deliberately engaging in this very risky driving behaviour.

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